

Remarks

The Office Action mailed October 20, 2005, has been reviewed. In view of the following remarks, it is Applicant's position that the above referenced patent application is in condition for allowance.

Information Disclosure Statement

As requested, Applicant has provided copies of all non-patent literature publications listed in the information disclosure statement including the date of these publications in compliance with 37 CFR 1.98(a)(2).

The Examiner should note a non-patent prior art excerpt from Taylor, D.M., Secker, P.E., Industrial Electrostatics: Fundamentals and Measurements, has been included within the Supplemental Information Disclosure Statement.

Claim Rejections - 35 USC § 103

Claims 1, 10, and 21

In the Office Action dated October 20, 2005, the Examiner rejected independent claims 1, 10, and 21 under 35 U.S.C. 103(a) as being unpatentable over Stewart (US 5,315,232) in view of Sasaki (US 3,846,700). For the reasons set forth below, Applicants respectfully disagree with the Examiner's rejection of independent claims 1, 10, and 21 under 35 U.S.C. 103(a) and thus dependent

claims 2-4, 8, 11-13, 17, and 22-24.

The prior art references of U.S. Patent No. 5,315,232, issued to Stewart, and U.S. Patent No. 3,846,700, issued to Sasaki, et al., whether viewed singularly or in combination, do not disclose, teach, or even suggest the inventive concept recited in claims 1, 10, and 21. Specifically, the Examiner is respectfully directed to MPEP §2143.01 where it is stated "the proposed modification cannot change the principle of operation of a reference." The proposed modification of the Stewart reference with the teachings of Sasaki would change the principle of operation of Stewart's invention. That is, modifying the Stewart reference with the Sasaki reference would require a substantial reconstruction and redesign of the elements of the Stewart reference.

The Stewart reference discloses a system for measuring and recording DC electric field data using periodically exposed sensing electrodes. Applicants agree with Examiner that Stewart does not disclose means for determining an average leakage current at the input of the charge measurement circuit, and means for generating a compensation current generally equal to and opposite in polarity to the determined average leakage current at the input of the charge measurement circuit, wherein the compensation current is supplied to the input of the charge measurement circuit.

The Sasaki reference is cited for the proposition that it suggests means for determining an average leakage current at the input of the charge measurement circuit, and means for generating a compensation current (by neutralizing the current) generally

equal to and opposite in polarity to the determined average leakage current at the input of the charge measurement circuit, wherein the compensation current is supplied to the input of the charge measurement circuit.

The Sasaki reference couples a voltage follower amplifier output to an intermediate feedback electrode inserted between insulators in order to try and maintain zero volts across the sense electrode to feedback electrode insulator. However, the voltage across the sense electrode continually changes from zero with induced charge creating a measurement error. The field meter taught by the Stewart reference does not use the voltage follower amplifier model of the Sasaki patent but instead uses a "virtual ground." The virtual ground approach eliminates the measurement error caused by non-zero voltages on the sense electrode. By utilizing negative feedback, the sense electrode is held at a zero volt reference potential. This virtual ground also provides an added benefit in allowing the voltage difference across the insulators to be kept closer to zero volts than with the voltage follower model further minimizing leakage current.

The proposed modification of the charge amplifier circuit in the Stewart reference to include the voltage follower amplifier output to an intermediate feedback electrode as taught by the Sasaki reference, would change the principle of operation of the virtual ground in the Stewart reference. That is, modifying the Stewart reference by using the voltage follower amplifier model of the Sasaki patent requires a substantial reconstruction and

redesign of the elements of the Stewart reference as well as a change in the basic principle of eliminating the measurement error caused by non-zero voltages on the sense electrode under which the Stewart reference was designed.

Further, neither the Stewart reference nor the Sasaki reference teaches the means for determining an average leakage current as recited in claims 1, 10, and 21. Sasaki teaches a voltage follower amplifier that provides feedback based upon only the current state of the sense and feedback electrode.

In view thereof, Applicants request that the Examiner reconsider and withdraw the rejection of independent claims 1, 10, and 21 under 35 U.S.C. 103(a) and dependent claims 2-4, 8, 11-13, 17, and 22-24 as being unpatentable over Stewart (US 5,315,232) in view of Sasaki (US 3,846,700).

Claims 26 and 27

The Examiner rejected claims 26 and 27 under 35 U.S.C. 103(a) as being unpatentable over Stewart (US 5,315,232) in view of Sasaki (US 3,846,700). Examiner contends the means for determining and correcting zero offset-signal output error are considered obvious means as required for routinely performing instrument calibration.

For example, as recited in pages 4 and 5 of the patent application, typically, zero offset-signal output error is set during manufacturing. However, unknown sources cause the value to change over time with use. There is valuable information about atmospheric electrical conditions obtained around zero and at the zero-crossing. Field meters that do not provide for uncorrected

zero offsets automatically and continuously may not provide information of high quality over long periods of use and may require labor intensive testing and adjusting at times to be determined empirically.

The Stewart reference and the Sasaki reference do not provide any teaching or suggestion on determining the zero-signal offset error automatically and continuously. As recited in claims 26 and 27, the electric field meter comprises "means for automatically and continuously determining a zero-signal offset error." For example, as recited on page 36 of the patent application, one way of implementing the means for automatically and continuously determining a zero-signal offset error involves a microcontroller to measure and correct the zero-signal offset error when the sense electrode is completely shielded from the external electric field and mathematically compares the value to the digitized output when the shield assembly is exposed to the external electric field. Thus, as stated in the patent application the zero-signal offset errors can be taken at any desired rate including but not limited to one or more times per measurement cycle or any other desired rate. Moreover, the correction for the zero-signal offset error can be accomplished locally or at a remote site.

In view thereof, Applicants request that the Examiner reconsider and withdraw the rejection of independent claim 26 and dependent claim 27 under 35 U.S.C. 103(a) as being unpatentable over Stewart (US 5,315,232) in view of Sasaki (US 3,846,700).

Claims 5, 6, 14 and 15:

Further in the Office Action, the Examiner rejected claims 5, 6, 14, and 15 under 35 U.S.C. 103(a) as being unpatentable over Stewart (US 5,315,232) in view of Sasaki (US 3,846,700) and in view of Uber (US 6,353,324). For the reasons set forth below, Applicants respectfully disagree with the Examiner's rejection of claims 5, 6, 14, and 15.

The prior art references of U.S. Patent No. 5,315,232, issued to Stewart, U.S. Patent No. 3,846,700, issued to Sasaki, et al., and U.S. Patent No. 6,353,324, issued to Uber, et al., whether viewed singularly or in combination, do not disclose, teach, or suggest the inventive concept recited in claims 5, 6, 14 and 15. Examiner states that Stewart as modified by Sasaki discloses all of the claimed limitations as set forth by Applicants except compensation voltage source generating a programmable compensation output and a resistance in which the compensation current is developed wherein the compensation voltage source is a digital-to-analog converter.

As stated above, the proposed modification of the charge amplifier circuit in the Stewart reference to include the voltage follower amplifier output to an intermediate feedback electrode as taught by the Sasaki reference would change the principle of operation of the virtual ground in the Stewart reference. For this reason alone, it is believed that there is no suggestion to modify Stewart with Sasaki in the manner suggested.

Further, in addition to using a voltage follower similar to

Sasaki, the compensation voltage in Uber's dynamic range circuit does not disclose, suggest, or teach the compensation voltage source generating a programmable compensation output as recited in claims 5 and 14. Further, Uber does not disclose, suggest, or teach the compensation voltage source as a digital-to-analog converter controlled by the means for determining an average leakage current at the input of the charge measurement circuit as recited in claims 6 and 15. For example, as stated in the patent application, when the sense electrode is completely shielded from the external electric field, the zero-signal offset error is digitized and stored for comparison in such a way that the average leakage current is determined.

Although Applicants and Uber both use digital-to-analog converters, Uber uses successive approximation in providing DAC feedback at each stage of amplification. The successive approximation is a trial and error process for each of the separate amplification stages. Uber's trial and error method does not measure and store the zero-signal offset error for comparison in such a way that the average leakage current is determined.

In view thereof, Applicants request that the Examiner withdraw the rejection of claims 5, 6, 14, and 15 under U.S.C. 103(a) as being unpatentable over Stewart (US 5,315,232) in view of Sasaki (US 3,846,700) in further view of Uber (US 6,353,324).

CONCLUSION

The foregoing is meant to be a complete response to the Office Action mailed October 20, 2005. It is respectfully submitted that this application is in condition for allowance for the reasons stated above. Therefore, it is requested that the Examiner reconsider each and every rejection as applicable to the claims pending in the application and pass such claims to issue. Should the Examiner have any comments or questions regarding the foregoing, Applicant's attorney would welcome a telephonic interview with the Examiner.

Respectfully submitted,



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